



Synchro flange



Hub shaft

- Compact design: 50mm length for single or multiturn
- Aids for start up and operation: diagnostic LED, preset key with optical response, status information
- Use of sine/ cosine signals for fast control task possible
- Control input: Direction
- Resolution up to 29 Bit

TECHNICAL DATA mechanical

Housing diameter	58 mm
Protection class shaft input	IP64 or IP67
Protection class housing	IP64 (IP67 optional)
Flange	Synchro flange, clamping flange, hubshaft with tether, square flange
Shaft diameter	Solid shaft 6 mm, 10 mm; Hub shaft 10 mm, 12 mm
Max. speed	Continuous 10 000 min ⁻¹ , short term 12 000 min ⁻¹
Starting torque	≤ 0.01 Nm
Moment of inertia	3.8 x 10 ⁻⁶ kgm ²
Spring tether (hollow shaft)	
Tolerance axial	±1.5 mm
Tolerance radial	±0.2 mm
Max. shaft load	axial 40 N / radial 60 N
Shock resistance DIN EN 60068-2-27	1 000 m/s ² (6ms)
Vibration resistance DIN EN 60068-2-6	100 m/s ² (10 ... 2.000 Hz)
Operating temperature	-40 ... 100 °C
Storage temperature	-25 ... 85 °C (because of packing)
Weight approx. ST/MT	260 g / 310 g

TECHNICAL DATA electrical

Supply voltage	DC 5 V, -5 % / +10 % or DC 10–30 V
Max. current w/o load ST/MT	50 mA / 100 mA
Interface	Standard SSI or BiSS
Lines / drives	Clock and Data / RS422
Output code	Binary or Gray parameterization with ACURO soft
Linearity	± ½ LSB (± 1 LSB for resolution > 13 Bit)
Resolution singleturn	10–17 Bit , Gray Excess: 360, 720 increments
Resolution multiturn	12 Bit
Incremental signals optional	Sine - Cosine 1 Vpp
Number of pulses	2 048
3dB limiting frequency	500 kHz
Absolute accuracy	±35''
Repeatability	±7''
Parameterization with Acuro soft	Code type, direction, warning, alarm
Control input	Direction
Reset key	Disable via parameterization
Alarm output	Alarm bit (SSI Option), warning bit and alarm bit (BiSS)
Status LED	Green = ok.; red = alarm
Connection	Cable or conin, axial or radial

DIMENSIONAL DRAWINGS

see chapter "Dimensional drawings ACURO industry", starting page 146

RECOMMENDED DATA TRANSFER RATE WITH SSI

The max. data transfer rate depends on the cable length.
For Clock/ Clock and Data/ Data please use twisted pairs. Use shielded cable.

Cable length	Frequency
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

DATA FORMAT singlturn

Resolution	Data bits											
	T1 ... T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	
9 Bit ¹	S8 ... S0	0	0	0	0	0	W ²					
10 Bit ¹	S9 ... S1	S0	0	0	0	0	W ²					
11 Bit ¹	S10 ... S2	S1	S0	0	0	0	W ²					
12 Bit ¹	S11 ... S3	S2	S1	S0	0	0	W ²					
13 Bit ¹	S12 ... S4	S3	S2	S1	S0	0	W ²					
14 Bit ¹	S13 ... S5	S4	S3	SS2	S1	S0	0	W ²				
15 Bit ¹	S14 ... S6	S5	S4	S3	S2	S1	S0	0	W ²			
16 Bit ¹	S15 ... S7	S6	S5	S4	S3	S2	S1	S0	0	W ²		
17 Bit ¹	S16 ... S8	S7	S6	S5	S4	S3	S2	S1	S0	0	W ²	

Examples for data format 9 Bit and 13 Bit with the optional bits alarm und parity

Resolution	Data bits											
	T1 ... T9	T10	T11	T12	T13	T14	T15	T16	T17	T18	T19	
9 Bit + P ³	S8 ... S0	0	0	0	P	0	W ²					
9 Bit + A ⁴	S8 ... S0	0	0	0	A	0	W ²					
9 Bit + P ³ + A ⁴	S8 ... S0	0	0	0	A	P	0	W ²				
13 Bit + P ³	S12 ... S4	S3	S2	S1	S0	P	0	W ²				
13 Bit + A ⁴	S12 ... S4	S3	S2	S1	S0	A	0	W ²				
13 Bit + P ³ + A ⁴	S12 ... S4	S3	S2	S1	S0	A	P	0	W ²			

DATA FORMAT Multiturn

Resolution	Data bits											
	T1 ... T12	T13 ... T21	T22	T23	T24	T25						
24 Bit ¹	M11 ... M0	S11 ... S2	S1	S0	0	W ²						
25 Bit ¹	M11 ... M0	S12 ... S3	S2	S1	S0	0	W ²					
26 Bit ¹	M11 ... M0	S13 ... S4	S3	S2	S1	S0	0	W ²				

Example for data format 24 Bit with the optional bits alarm und parity

24 Bit + P ³	M11 ... M0	S11 ... S2	S1	S0	P	0	W ²					
24 Bit + A ⁴	M11 ... M0	S11 ... S2	S1	S0	A	0	W ²					
24 Bit + P ³ + A ⁴	M11 ... M0	S11 ... S2	S1	S0	P	A	0	W ²				

S0 ... S16 Data bits for resolution per revolution

M0 ... M11 Data bits for number of revolutions (only for multiturn)

¹ Options (Parity bit, alarm and parity bit, zero bit) on request

² W: from this data bit on the data iteration for multiplex starts

³ Parity bit :Even Parity (The parity bit expands the data bits to an even number of 1-bits).
(Option)

⁴ Alarm bit: is set to "1" when over temperature, under temperature, disc breakage and defect LED

SYNCHRONOUS-SERIAL TRANSFER (SSI)

Synchronous readout of the encoder data is according to the clock rate given by the SSI-counterpart.

The number of clock rates is determined by the type of encoder (singleturn resp. multiturn) and the configuration of the special Bits as defined.

For multiple transactions (the stored value is readout several times successively) a fixed clock rate per transaction must be kept (for singleturn 13 resp. 14 clocks, for multiturn 25 resp. 26 clocks).

- In the rest position, when the last clock brush has passed by more than 30µs, the data output is logically at "1".
- With the first descending clock edge the encoder data and the special bits are loaded in the shift register of the encoder interface.

- With each ascending clock edge the data bits are serially readout, beginning with the MSB.

- At the end of the data transfer the data output is set to logically "0" for approx. 20µs.

If within these 20µs a further clock brush reaches the encoder interface, the already transferred data is readout once again.

This multiple transfer of the same data makes it possible to recognize transfer errors.

- After the 20µs the data output goes to its rest position, logically "1". Subsequently new encoder data can be readout.

PIN ASSIGNMENT Cable & Conin

Cable	Conin	Signal
brown ³	1	0V (supply voltage)
pink	2	Data
yellow	3	Clock
	4	N.C.
blue	5	Direction ¹
red	6	N.C.
violet	7	N.C.
white ³	8	DC 5/10 - 30 V
	9	N.C.
grey	10	Data
green	11	Clock
black	12	0V-signal output ²

¹ Direction: + U_B or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw

² Connected with 0 V in the encoder. Use this output to lay Direction on logical "0" if required.

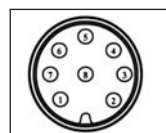
³ use only the thin wires (∅ = 0.14 mm)

PIN ASSIGNMENT M12



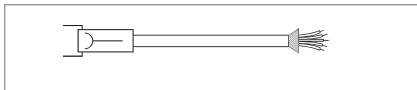
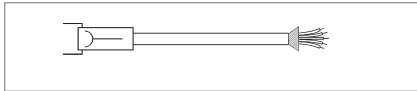
M12 Plug-in connector 8 pole		
Colour	Pin	Signal
white	1	DC 10 - 30 V
brown	2	0 V
	3	N.C.
green	4	Clock
pink	5	Data
yellow	6	Clock
blue	7	Direction ¹
grey	8	Data

¹ Direction: + U_B or unconnected = ascending code values with rotation cw
0 V = descending code values with rotation cw



View on connector

ACCESSORIES



	Ordering code
M12 plug	3 539 597

Extension cable with M12 plug	Ordering code
3 m	1 565 329
5 m	1 565 330
10 m	1 565 331

Mating connector: 12 pin Conin	
	Ordering code
clockwise (C,D)	3 539 202
counter clockwise (G,H)	3 539 229
cable not made up with connector	see chapter "Accessories" (page 236) (ordering code 3 280 220)

Extension cable with plug	Ordering code
clockwise 3 m	1 542 003
(C,D) 5 m	1 542 004
10 m	1 542 005
counter clockwise 3 m	1 542 010
(G,H) 5 m	1 542 011
10 m	1 542 012

	Ordering code
ACURO soft, PC connecting cable, incl. power pack 230 VA, for CONIN 12 pole, CCW (suited for supply voltage E and connection G or H)	on request

	Ordering code
Position indicationsigno-SSI	see chapter "Accessories" (page 236)
Mounting eccentric for synchronous flange	0 070 655
Diaphragm coupling (hub 6/6 mm)	3 520 081
Diaphragm coupling (hub 10/10 mm)	3 520 088

ORDERING INFORMATION ACURO industry BiSS

Type	Resolution	Supply voltage	Flange, Protection, Shaft	Interface	Connection
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC58	0010 10 Bit ST 0012 12 Bit ST 0013 13 Bit ST 0014 14 Bit ST 0017 17 Bit ST 0360 360 increments ST ¹ 0720 720 increments ST ² 1212 12 Bit MT+12 Bit ST 1213 12 Bit MT+13 Bit ST 1214 12 Bit MT+14 Bit ST 1217 12 Bit MT+17 Bit ST higher resolutions on request	A DC 5 V * E DC 10 - 30 V	S.41 Synchro, IP64, 6x10mm S.71 Synchro, IP67 ³ , 6x10mm K.42 Clamping, IP64, 10x19.5mm K.72 Clamping, IP67 ³ , 10x19.5mm K.46 Clamping, IP64, 9.52x19.5mm K.76 Clamping, IP67 ³ , 9.52x19.5mm F.42 Hubshaft with tether, IP64, 10x19.5mm hollow shaft F.47 Hubshaft with tether, IP64, 12x19.5mm hollow shaft F.46 Hubshaft with tether, IP64, 9.52x19.5mm hollow shaft Q.42 Square, IP64, 10x19.5mm Q.72 Square, IP67 ³ , 10x19.5mm Q.46 Square, IP64, 9.52x19.5mm Q.76 Square, IP67 ³ , 9.52x19.5mm	BI BiSS (Digital) BC BiSS (+SinCos 1Vpp) ⁴	A Cable axial B Cable radial C Conin 12 pole axial cw D Conin 12 pole radial cw G Conin 12 pole axial ccw H Conin 12 pole radial ccw 7 M 12, 8 pole axial 8 M 12, 8 pole radial

¹ with Offset 76 (value range 76...435)
² with Offset 152 (value range 152...871)
³ Protection class IP67 not available in combination with preset key and LED display
⁴ not with connection "7" and "8"
 * max. cable length: 40 m
Preferably available versions are printed in bold type.

ORDERING INFORMATION ACURO industry SSI

Type	Resolution	Supply voltage	Flange, Protection, Shaft	Interface	Connection
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AC58	0010 10 Bit ST 0012 12 Bit ST 0013 13 Bit ST 0014 14 Bit ST 0017 17 Bit ST 0360 360 increments ST ¹ 0720 720 increments ST ² 1212 12 Bit MT+12 Bit ST 1213 12 Bit MT+13 Bit ST higher resolutions on request	A DC 5 V * E DC 10 - 30 V	S.41 Synchro, IP64, 6x10mm S.71 Synchro, IP67 ³ , 6x10mm K.42 Clamping, IP64, 10x19.5mm K.72 Clamping, IP67 ³ , 10x19.5mm K.46 Clamping, IP64, 9.52x19.5mm K.76 Clamping, IP67 ³ , 9.52x19.5mm F.42 Hubshaft with tether, IP64, 10x19.5mm hollow shaft F.47 Hubshaft with tether, IP64, 12x19.5mm hollow shaft F.46 Hubshaft with tether, IP64, 9.52x19.5mm hollow shaft Q.42 Square, IP64, 10x19.5mm Q.72 Square, IP67 ³ , 10x19.5mm Q.46 Square, IP64, 9.52x19.5mm Q.76 Square, IP67 ³ , 9.52x19.5mm	SB SSI Binary SG SSI Gray SC SSI Gray (+SinCos 1Vpp) ⁴	A Cable axial B Cable radial C Conin 12 pole axial cw D Conin 12 pole radial cw G Conin 12 pole axial ccw H Conin 12 pole radial ccw 7 M 12, 8 pole, axial 8 M 12, 8 pole, radial

¹ with Offset 76 (value range 76...435)
² with Offset 152 (value range 152...871)
³ Protection class IP67 not available in combination with preset key and LED display
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